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Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:

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Examiner: Phillip A. Johnston

Application No.: 10/078,056

Art Unit: 2881

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For: X-RAY IMAGING DEVICE

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AMENDMENT UNDER 37 C.F.R. § 1.312(a)
AFTER ALLOWANCE

Sir:

Although the above-identified application has been allowed, applicants respectfully request that the application be amended pursuant to 37 C.F.R. § 1.312(a) as follows:

AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph [0052] on page 17, with the following amended paragraph:

[0052] In another embodiment, the digital radiography imager may be a flat panel imager that converts x-rays to electrical charges directly without a scintillator layer (i.e., direct x-ray imager). This type of imager substitutes a semiconductor or photoconductor layer for the scintillator layer. In describing

the following figures, the terms “semiconductor” and “photoconductor” are used interchangeably in describing a direct conversion x-ray imager. **FIGURE 5** illustrates a cross-sectional view of one embodiment of semiconductor-based flat panel imager. Imager 500 has bias electrode layer 520, semiconductor layer 530, charge collection layer 540, and substrate layer 550. In an alternative embodiment, a printed circuit board (“PCB”) layer 510 may be disposed above bias electrode layer 520. Bias electrode layer 520 is disposed above semiconductor layer 530. Semiconductor layer 530 is disposed above charge-collection layer 540, and charge-collection layer 540 is disposed above substrate layer 550. Charge-collection layer 540 has an array of charge-collection electrodes (e.g., electrodes 542, 544). Charge-Semiconductor layer 530 has first surface ~~532~~ 531 adjacent to charge-collection layer 540. Semiconductor layer 530 also has second surface ~~534~~ 533 adjacent to bias electrode layer 520. An electric field is applied across the semiconductor layer through electrode layer 520.

Please replace the paragraph [0053] on page 17, with the following amended paragraph:

[0053] In use, x-rays propagate through the layers of flat panel imager 500. Flat panel imager 500 is configured such that x-rays traverse charge-collection layer 540 and incident to first surface ~~532~~ 531 of semiconductor layer 530 before the x-rays propagate through semiconductor layer 530. As semiconductor layer 530 absorbs the x-rays, electrical charges, representative of charges ~~532~~, ~~534~~, are drawn towards charge-collection electrodes (e.g., 542, 544) of charge-collection layer 540. The charges may be collected, amplified and quantified to a digital code for corresponding pixels to produce an image.

Please replace the paragraph [0054] on page 18, with the following amended paragraph:

[0054] In one embodiment of the present invention, as illustrated in FIGURE 5, x-rays propagate through first surface ~~532~~ 531 of semiconductor layer 530. Because first surface ~~532~~ 531 is adjacent to charge-collection layer 540, electrical charges (e.g., 532, 534) do not have to travel across a thickness of semiconductor layer 530 to reach charge collection layer 540. As such, the diffusion of the electrical charges (e.g., 532, 534) may be minimized, and the efficiency of charge-collection layer 540 may be greater compared to propagating x-rays incident at second surface ~~534~~ 533 of scintillator 530. For semiconductor (photodetector)-based imagers, the semiconductor material may include amorphous selenium ("a-Se"), lead oxide iodide and oxide, mercuric iodide, CdTe and CdZnTe.

Please replace the paragraph [0032] on page 10, with the following amended paragraph:

[0032] Scintillator layer 220 absorbs x-rays and generates visible light corresponding to the amount of x-ray absorbed. Photodiode layer 240 detects the light corresponding to the amount of x-ray absorbed. Photodiode layer 240 converts the visible light to electric charges to generate a pixel pattern on a